UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,153	07/28/2003	Christian Bonnet	Serie 6034	4378

7590 03/06/2009

Linda K. Russell
Air Liquide
Suite 1800
2700 Post Oak Blvd.
Houston, TX 77056

EXAMINER	
ELVE, MARIA ALEXANDRA	

ART UNIT	PAPER NUMBER
3742	

MAIL DATE	DELIVERY MODE
03/06/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/628,153
Filing Date: July 28, 2003
Appellant(s): BONNET ET AL.

Elwood L. Haynes
Air Liquide
2700 Post Oak Blvd., 18th Floor
Houston, TX 77056
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 12/2/08 appealing from the Office action mailed 8/10/06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

3,392,017	Quaas et al.	7-1968

4,423,618	Clarke	1-1984
2003/0021717	Harris	1-2003

Glossary of Metallurgical Terms and Engineering Tables, American Society of Metals, Ohio (c) 1979, pp. 9 & 78.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Quaas et al. (USPN 3,392,017) in view of Davidian et al. (USPN 6,347,662).

Quaas et al. discloses welding which uses a copper based alloy that also contains tin (4-25%) and phosphorous (0.1-1%), the balance being copper. The copper based alloy is deposited using a variety of welding processes, such as carbon arc, oxy-fuel, tungsten inert gas, atomic hydrogen welding open arc-welding and so forth. Examples include copper tube and wire. Composition examples are: 1 to 17% copper base alloy containing 7.5% phosphorus and 22 to 69% copper base alloy containing 18% tin. The core wire can be of a metal such as, pure copper or tin bronze alloy.

Quaas et al. does not teach forming a heat exchanger in the arc welding process.

Davidian et al. discloses a heat exchanger comprised of a plurality of plates made of copper, aluminum or stainless steel. The exchanger is made of a stack of vertical and parallel rectangular plates between which spacer corrugations that also form fins are interposed. Each pair of plates delimits a passage of flat overall shape. These plates are attached using a brazing filler material. The exchanger can be used for exchanging heat between at least two fluids in an air separation unit and can be used cryogenically.

It would have been obvious to one of ordinary skill in the art at the time of the invention to direct the welding process, as taught by Quaas et al. to the Davidian et al. heat exchanger because this is merely an application of the arc welding process.

Claims 39 & 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davidian et al. and further in view of Quaas et al. or Clarke (USPN 4,423,618) or Harris (USPAP 2003/0021717 A1).

Davidian et al. discloses a heat exchanger comprised of a plurality of plates made of copper, aluminum or stainless steel. The exchanger is made of a stack of vertical and parallel rectangular plates between which spacer corrugations that also form fins are interposed. Each pair of plates delimits a passage of flat overall shape. These plates are attached using a brazing filler material. The exchanger can be used for exchanging heat between at least two fluids in an air separation unit and can be used cryogenically.

Davidian et al. does not specifically teach the presence of phosphorus.

Quaas et al. discloses welding which uses a copper based alloy that also contains tin (4-25%) and phosphorous (0.1-1%), the balance being copper. The copper based alloy is deposited using a variety of welding processes, such as carbon arc, oxy-fuel, tungsten inert gas, atomic hydrogen welding open arc-welding and so forth. Examples include copper tube and wire.

Clarke discloses brazing of heat exchangers using phosphorous bearing copper filler metal.

Harris discloses a phosphorous-copper-antimony-tin braze for making ductile brazes in heat exchangers.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a phosphorous-copper braze as taught by Quaas et al. or Clark or Harris, in the Davidian et al. system because of the ductile joints which the braze produces.

Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davidian et al. and further in view of Quaas et al.

Davidian et al. discloses a heat exchanger comprised of a plurality of plates made of copper, aluminum or stainless steel. The exchanger is made of a stack of vertical and parallel rectangular plates between which spacer corrugations that also form fins are interposed. Each pair of plates delimits a passage of flat overall shape. These plates are attached using a brazing filler material. The exchanger can be used for

exchanging heat between at least two fluids in an air separation unit and can be used cryogenically.

Davidian et al. does not teach the use of copper/tin braze.

Quaas et al. discloses welding which uses a copper based alloy that also contains tin (4-25%) and phosphorous (0.1-1%), the balance being copper. The copper based alloy is deposited using a variety of welding processes, such as carbon arc, oxy-fuel, tungsten inert gas, atomic hydrogen welding open arc-welding and so forth. Examples include copper tube and wire.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a Cu-Sn-P brazing filler material as taught by Quaas et al. in the Davidian et al. heat exchanger production because it is merely a variation of an already required brazing component.

(10) Response to Argument

Prior to addressing applicant's arguments the examiner respectfully will address definitions and terminology.

Applicant states the following definitions:

Brazing *is a process for joining similar or dissimilar metals using a filler metal that typically includes a base of copper combined with silver, nickel, zinc or phosphorous. Brazing differs from welding in that <u>brazing does not melt the base metal</u>; therefore <u>brazing temperatures are lower than the melting points of the base metals</u>.*

Welding *on the other hand is a process for joining similar metals by melting and fusing two metals together.*

The examiner respectfully wishes to add the following from American Society for Metals:

Welding *is the joining of two or more pieces by applying heat or pressure, or both, with or without filler material to produce a localized union through fusion or recrystallization across the interface. Welding is generally extended to include brazing and soldering.*

Brazing*: A group of welding processes that join solid materials together by heating them to a suitable temperature and by using a filler metal having a liquidus above 450°C (840°F) and below the solidus of the base materials. The filler metal is distributed between the closely fitted surfaces of the joint by capillary attraction.*

It is well known in the metallurgical industry that low temperature welding is another common term (definition) for brazing.

Applicant's arguments:

Rejection of claim 50 under 35 USC 35 USC § 103(a) as being unpatentable over Quaas et al. (USPN 3,392,017) in view of Davidian et al. (USPN 6,347,662).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of a prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the

references themselves or in the knowledge generally available to one of ordinary skill in the art. See In re Fine, 837 F.2d 1071, 5 USPQ 2d 1596 (Fed Cir. 1988) and In re Jones, 9589 F.2d 347, 21 USPQ 2d 1941 (Fed. Cir. 1992). In this case, one reference, Davidian et al., is drawn to a heat exchanger which is constructed with brazing using copper and copper based alloys and the other references Quaas et al., Clarke and Harris are drawn to copper based alloys which are used in brazing (low temperature welding) applications. The motivation to combine being based on low melting temperature alloys used in brazing (low temperature welding) applications, one of which is the brazing (low temperature welding) of a heat exchanger.

Applicant argues that Quaas et al. does not specifically describe the alloy as being brazed. The examiner respectfully disagrees because the “copper based alloy (low melting welding alloy) has a sufficiently low melting point to permit molten deposition on brass, bronze and copper without the melting of the base metal” (abstract, col. 2, lines 5-10). It should be noted that Quaas et al. states that the base metal is NOT melted and applicant states (see above) that brazing does not melt the base metal. Thus, applicant’s brazing definition and Quaas et al. low melting welding defines one and the same thing.

Applicant argues that Quaas et al. does not disclose the alloy being deposited onto another brazed alloy. The examiner respectfully disagrees because the Quaas et al. states that the copper alloy is deposited, that is, “copper based alloys… for general deposition by welding on low melting base metals such as brass and bronze” (col. 1,

lines 26-32). In addition, Quaas et al. states: “deposits of the …welding alloys may be used in a variety of welding uses such as for example overlaying” (col. 10, lines 47-53). The examiner respectfully notes that brass (primarily a copper and zinc based alloy) and bronze (primarily a copper and zinc based alloy) are part of the low melting alloys that may be used in brazing solders (copper and zinc alloy –ASM) the same as the copper based low melting alloy disclosed by Quaas et al. Thus, Quaas does suggest the deposition of a braze on to another braze alloy.

Applicant argues that Davidian et al. only describes connecting heat exchanger plates by brazing and not welding. The examiner respectfully notes that brazing of the plates and welding of the heat exchanger pipe is disclosed (col. 1, lines 22 & 36, col. 2, line 64, col. 3, lines 4, 16 & 21). Welding of the plates is not specifically taught, however, it should be noted that brazing is also defined as low temperature welding. In addition, welding of the heat exchanger pipe is disclosed, albeit not the plates, the use of welding is taught by Davidian et al. Furthermore, in response to applicant’s arguments against the references individually, one cannot show nonobviousness by attacking reference individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that Davidian et al. does not disclose brazing the one copper alloy onto a separate brazed alloy. The examiner respectfully disagrees because the heat exchanger plates are comprised of copper based alloys and it is well known that many copper based alloys are brazing (low melting temperature welding) alloys. This in

combination with the braze filler material yields a combination of a copper alloy and a brazed alloy.

Applicant argues that the references, Davidian et al. and Quaas et al. fail to teach welding a workpiece to an alloy which itself has been deposited on a brazed zone comprising another alloy, as claimed. The examiner respectfully disagrees because claim 50 does not state the limitation “another alloy”, rather the claim states an “additional layer”, and there is nothing in the claim to preclude using a copper/phosphorus/at least 1.0% tin alloy for one or both of the layers. Quaas et al. discloses welding which uses a copper based alloy that also contains tin (4-25%) and phosphorous (0.1-1%), the balance being copper (see table col. 2, lines 15-25), which comprises the alloy limitations of claim 50. In addition, Davidian et al. teaches a heat exchanger comprising: parallel plates (8) having a rectangular shape (made of an alloy comprising at least 80% copper), separated by exchange corrugations (6) (made of copper or an alloy comprising at least 80% copper) which are fixed by brazing filler material (col. 1, lines 58-67, col. 3, lines 13-22). It is the examiner’s position that the corrugations by nature of their low melting temperature composition may be classified as brazing materials (i.e. a brazed zone). The combination of the corrugations with the brazing filler material yields: “welding a workpiece to an alloy which itself has been deposited on a brazed zone” as stated in applicant’s claim 50. Furthermore, with respect to welding of the workpiece as stated above: *Welding is generally extended to include brazing and soldering* *and* ***Brazing****: A* *group of welding processes* and It is well known in the metallurgical industry that low temperature welding is another common

term (definition) for brazing. Thus, Davidian et al. by disclosing brazing in the reference, is also disclosing low temperature welding.

Rejection of claims 39 & 42 under 35 USC 35 USC § 103(a) as being unpatentable over Davidian et al. in view of Quaas et al. or Clarke (USPN 4,423,618) or Harris (USPAP 2003/0021717 A1).

Applicant argues that the combination of Davidian et al. reference with Quaas et al. reference does not teach or suggest providing two separate alloys and welding to a brazed matrix, as required by claims 39 and 42. The examiner respectfully disagrees because the claims do not state the limitation: "two separate alloys" rather claim 39 states "at least one layer of an alloy containing copper and tin being deposited on at least part of the brazed matrix comprising copper and phosphorus". There is nothing in the claim to preclude the layer of copper and tin and the brazed matrix comprising copper and phosphorus being one and the same with respect to alloy composition. For example the alloy disclosed by Quaas et al. which discloses welding (low temperature welding) using a copper based alloy that also contains tin (4-25%) and phosphorous (0.1-1%), the balance being copper (see table col. 2, lines 15-25), which comprises the alloy/braze matrix limitations of claim 39. Furthermore, with respect to welding of the workpiece, as stated above: *Welding is generally extended to include brazing and soldering* and **Brazing**: *A group of welding processes* and It is well known in the metallurgical industry that low temperature welding is another common term (definition)

for brazing. Thus, Davidian et al. by disclosing brazing in the reference, is also disclosing low temperature welding.

Applicant argues that Clarke does not mention using separate alloys or layering the alloys during the brazing operation. Further, a welding operation is not disclosed by Clarke reference and therefore, the Clarke reference does not teach welding a container to a layer of a brazed matrix. The examiner respectfully disagrees because the claim does not state, “separate alloys or layer of alloys”. The claims state: “at least one layer of an alloy containing copper and tin being deposited on at least part of the brazed matrix comprising copper and phosphorus”. Clarke discloses brazing of heat exchangers using phosphorous bearing copper filler metal on a copper heat exchanger material. In addition, Davidian et al. teaches a heat exchanger comprising: parallel plates (8) having a rectangular shape (made of an alloy comprising at least 80% copper), separated by exchange corrugations (6) (made of copper or an alloy comprising at least 80% copper) which are fixed by brazing filler material (col. 1, lines 58-67, col. 3, lines 13-22). It is the examiner’s position that the corrugations by nature of their low melting temperature composition may be classified as brazing materials (i.e. a brazed matrix). The combination of the corrugations with the brazing filler material yields: “welding said container to said at least one layer of the brazed matrix” as, stated in applicant’s claim 39. Furthermore, in response to applicant’s arguments against the references individually, one cannot show nonobviousness by attacking reference individually where the rejections are based on combinations of references. See *In re*

Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Furthermore, with respect to welding, as stated above: *Welding is generally extended to include brazing and soldering and* ***Brazing****: A group of welding processes* and it is well known in the metallurgical industry that low temperature welding is another common term (definition) for brazing. Thus, Davidian et al. by disclosing brazing in the reference, is also disclosing low temperature welding.

Applicant argues that Harris refers only to a brazing operation and does not mention welding or a separate alloy. The examiner respectfully disagrees because the claim does not state “a separate alloy”. The claims state: “at least one layer of an alloy containing copper and tin being deposited on at least part of the brazed matrix comprising copper and phosphorus”. Harris teaches melting an alloy having a composition: 6.0% to 7.0% phosphorus, about 2% to about 8% tin, about 2% antimony and the balance copper; applying the melted alloy to a joint to be brazed; allowing the melted alloy to cool; and forming a raised shoulder of solidified alloy about the joint without the substantial production of black oxide. The braze and brazing operation taught by Harris is applied to heat exchangers. Davidian et al. teaches a heat exchanger comprising: parallel plates (8) having a rectangular shape (made of an alloy comprising at least 80% copper), separated by exchange corrugations (6) (made of copper or an alloy comprising at least 80% copper) which are fixed by brazing filler material (col. 1, lines 58-67, col. 3, lines 13-22). It is the examiner’s position that the corrugations by nature of their low melting temperature composition may be classified as brazing materials (i.e. a brazed matrix). The combination of the corrugations with the

brazing filler material yields: “welding said container to said at least one layer of the brazed matrix” as, stated in applicant’s claim 39. Furthermore, in response to applicant’s arguments against the references individually, one cannot show nonobviousness by attacking reference individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Furthermore, with respect to welding, as stated above: *<u>Welding is generally extended to include brazing and soldering</u>* *and* ***Brazing****: A* *<u>group of welding processes</u>* and It is well known in the metallurgical industry that low temperature welding is another common term (definition) for brazing. Thus, Davidian et al. by disclosing brazing in the reference, is also disclosing low temperature welding.

Rejection of claim 46 under 35 USC 35 USC § 103(a) as being unpatentable over Davidian et al. in view of Quaas et al.

Applicant argues that claim 46 depends from claim 39 and as stated above, the combination of the Davidian et al. reference in view of Quaas et al. reference does not render claim 39 obvious. Therefore, claim 46 is not rendered obvious by the combination of Davidian et al. and Quaas et al. reference. The examiner respectfully submits that the arguments with respect to claim 39 have been addressed above, however, the examiner wishes to further discuss claim 46. Claim 46 adds the following limitations to claim 39: “a copper/tin alloy comprises tin in an amount of:

(a) at least about 1.05% tin by weight;

(b) at least about 1.2% tin by weight;

(c) less than about 10% tin by weight;

(d) about 2% to about 8% tin by weight; and

(e) about 3% to about 6% tin by weight".

It is the examiner's position that these copper alloy compositions of claim 46 are met by Quaas et al., that is, a copper based alloy that also contains tin (4-25%) and phosphorous (0.1-1%), the balance being copper (see table col. 2, lines 15-25). It has been held that one of ordinary skill in the art at the time of the invention was made would have considered the claimed compositions to have been obvious because close approximation or overlapping ranges in a composition is considered to establish a prima facie case of obviousness. See In re Malagari 182 USPQ 549, Titanium Metals v. Banner 227 USPQ 773, In re Nehrenberg 126 USPQ 383.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/M. Alexandra Elve/

Primary Examiner, Art Unit 3742

Conferees

/Henry Yuen/

Special Programs Examiner, TC 3700

/TU B HOANG/

Supervisory Patent Examiner, Art Unit 3742